

Review of the thesis

How the yellowhammer became a kiwi, by Pavel Pipek

This thesis mostly focuses on the emergence of song dialects in the yellowhammer. Singing is a central behaviour in the life of songbirds, being involved in essential tasks such as mating and territorial defense, and the existence of dialects has attracted much attention for its relevance in speciation processes. Therefore, the topic addressed in the thesis is important. A novel aspect of the thesis is the use of an invasive species to investigate song divergence. Thus, instead of focusing on the causes and consequences of biological invasions, the author uses invasive species to address a relevant question in evolutionary ecology. To do so, there is an impressive work to reconstruct the historical introductions of the species to NZ. Here the use of citizen science approaches is also novel and, although this approach can be criticised because it can generate bad quality data, this is not of particular concern for the present thesis because the data is extracted by the researchers themselves. I think these contributions alone are enough to meet the requirements of a PhD.

The thesis is very well written and easy to read, which makes the experience really enjoyable. The thesis is also original in dividing the section in different body parts, although I'm not sure this makes it easier to understand.

In the *introductory chapters*, I would have preferred a more integrative introduction, but I understand that this may be difficult when one tries to connect different fields. And in any case, the current format works quite well so no changes are required. Regarding the introductory chapters, I have to say that I'm not an expert in bird songs (I only have a paper on song frequency in urban dwellers and this was because of the insistence of one of my MSc students). However, I find the topic really interesting. Instead, I'm more familiar with the literature on biological invasions. My only criticism in this section is that the explanations about the role of propagule size in invasions is not that much updated. We now know that the life history of the species interacts with propagule size and that the effect depends on the degree of environmental matching (i.e. of adaptive displacement). But all this is not mentioned. The only feature characterising successful avian invaders appears to be the brain, but there is also similar evidence for a broad niche and high tolerance to urbanisation. These aspects are nonetheless little relevant for the conclusions of the thesis, so I can understand the author has not pay that much attention on them.

The body of the thesis contains four chapter. *Chapter 6* documents geographic variation in dialects by combining published literature with information generated by the same authors. The main finding is to show that the geographic distribution of dialects is more heterogeneous than generally assumed. **However, what I'm surprised is that the authors have not identified any single new dialect.** It seems they essentially rely on Hansen's paper. **I also wonder whether there would be a phylogenetic-based approach to better address the evolutionary origin of these dialects. I also miss an**



analysis of repeatability within populations. If a dialect is a geographic divergent song, differences within populations should be smaller than across populations. This can be formally tested with mixed models. Finally, when I was reading the chapter I **wondered why the authors do not directly quantify the nature of the dialect by taking measures in the sonogram and then using PCAs or similar ordination methods to separate them.** This is nonetheless done in *Chapter 7* for a geographic analysis of song dialects in Czechia.

Chapter 8 is the one in which I better see serious intentions by the candidate to challenge common wisdom, although this is also the most descriptive work. Still, the chapter is an excellent, rigorous historical account of the introduction of the yellowhammer in NZ. The claim for more rigor in the use of data is an important message nowadays that some scientists appear too much focussed on publishing the results than in doing a good job in producing them. In contrast with this general trend, the candidate seems to have learned very well the need to be rigorous, a crucial skill to become a scientist. The chapter is also very nicely written. I edited the paper for *Neobiota*, so I think it is a good contribution and I have little to say here. I only **wonder whether the candidate plans to do a similar study for other species and produce a stronger dataset.** Knowing not only propagule pressure but also the exact place of origin and introduction would provide new opportunities to disentangle the effects of demographic stochasticity and adaptive mismatches in explaining the varying success of species introductions.

Chapter 9 is, to me, the most important contribution of the author. As I already mentioned, I find very interesting the use of invasive species to explore dialects, and apparently this is the first time the approach is used. I think the author does an excellent job in assembling and analysing the data. The use of rarefaction is a good example of the rigor the author uses in approaching science. Again, I suggest in future studies better defining dialects, perhaps quantitatively, as the mosaic pattern suggests a lot of mixture which is unexpected if dialects evolve by geographic isolation (expected under some of the proposed hypotheses). Unfortunately, the reasons why NZ harbours a higher diversity of dialects than the UK remain largely unknown. **My main question here is why the author has not tried to go further in understanding the divergence of dialects?** In the introductory chapters the authors nicely summarise some questions, but the analyses presented are essentially descriptive. I think this can be an important avenue for future research. I also have additional questions. **By examining only the last notes of the song, could it be that you are not always identifying dialects but random individual variation? If differences between NZ and the UK reflect evolutionary divergence, this raises the question of what make NZ more prone to facilitate song divergence. May this be related to niche expansions (e.g. the use of a broader variety of habitats)?**

In sum, although the thesis is essentially descriptive and does not stand for the importance of the discoveries, my opinion is that the candidate has done an excellent job in developing, analysing and presenting a number of interesting ideas, and that in doing so he has learnt the basic skills to be a good scientist. As the thesis also meets all the formal requirements for Ph.D. thesis defense at the Faculty of Science of Charles



University in Prague, I highly recommend acceptance of this dissertation as fulfilling all the needs for the PhD.

Dr. Daniel Sol

CREAF (Centre for Ecological Research and Forestry Applications)

CSIC (Spanish National Research Council)

Bellaterra, Catalonia E-08193, Spain

TEL: +34 93-5814678

FAX: +34 93-5814151

E-MAIL: d.sol@creaf.uab.cat

Webpage: <http://dsolrueda.wix.com/sol-group>